THAT WHICH IS CLAIMED IS:

1. Method of synchronizing an independent data device (DEV) of a wireless data communications system on an incident pulsed signal of the ultra wide band type received from a channel by said independent data device, said incident signal containing a preamble (PRB) including a training sequence (TS1, TS2) having a series of pulses whose polarity and time shifts are defined by respective polarity code and time-hopping code, said method comprising a digital cross-correlation of the received signal with said training sequence, said cross-correlation step (81, 101) including algebraically summing in accordance with said polarity code (a_j), windows of said received signal, the starting points of said windows being determined by said time-hopping code (c_j), and a detection step for detecting the end point ($n_{synchro}$) of the preamble from the result of said cross-correlation step.

2. Method according to claim 1, characterized by the fact said training sequence is periodic and comprises replicas, each of which having a size of N samples and containing L pulses, by the fact that each window has a size of N samples, and by the fact that said digital cross-correlation step (81) is performed iteratively in a block-by-block fashion until a stop criterion is reached, the starting points of two consecutive blocks of correlation being separated by 2N samples, by the fact that for each iteration said digital cross-correlation step comprises:

- a) initializing (80) the content of an accumulation register capable of storing N data,

- b) taking (810) a first group of N samples of the received signal starting from the starting point of the corresponding block increased by the time shift of the first pulse,
- c) multiplying (811) said first group by the polarity of said first pulse,
- d) adding (812) the resulting group of N samples to the content of said accumulation register, and
- repeating sub-steps b) to d) for all the L pulses.

3. Method according to claim 1, characterized by the fact that said training sequence is periodic and comprises at least M+1 replicas, each replica having a size of N samples and containing L pulses, M being a sub-multiple of N greater than or equal to 2, by the fact that said digital cross-correlation step (101) is performed iteratively in a block-by-block fashion until a stop criterion is reached, the computation of each block being split into M slices which are computed by algebraically summing windows N/M samples long.

4. Method according to claim 3, characterized by the fact that the incident signal carries information within a super frame structure, each super frame containing said preamble including at least M+1 synchronization slots (SS) corresponding respectively to the replicas of the training sequence, and by the fact that each slice is computed using one synchronization slot.

5. Method according to claim 4, characterized by the fact that said digital cross-correlation step (101) is performed iteratively in a block-by-block fashion until a stop criterion is reached, the starting points of two consecutive blocks of correlation being separated by N +N/M samples, by the fact that for each iteration said digital cross-correlation step comprises:

- a) initializing the content (100) of an accumulation register capable of storing N/M data,
- b) taking (1010) a first group of N/M samples of the received signal starting from the starting point of the corresponding block increased by the time shift of the first pulse,
- c) multiplying (1011) said first group by the polarity of said first pulse,
- d) adding (1012) the resulting group of N/M samples to the content of said accumulation register, and
- repeating sub-steps b) to d) for all the L pulses.

6. Method according to claim 3, characterized by the fact that the incident signal carries information within a super frame structure, each super frame containing said preamble including at least M+1 synchronization slots corresponding respectively to the replicas of the training sequence, and by the fact that each slice is computed using several adjacent synchronization slots (SS) belonging to several consecutive super frames.

7. Method according to any one of claims 2 to 6, characterized by the fact that it comprises after each correlation iteration, a step of comparing the content of the accumulation register with a first predetermined threshold (TH1), and by the fact that said stop criterion comprises the detection of at least one sample, called peak, of said accumulation register having a value greater than said first predetermined threshold, or a predetermined maximum number of correlation iterations.

8. Method according to claim 7, characterized by the fact that said detection step comprises a first sub-step of detecting one replica of said training sequence, said first sub-step comprising storing in memory means (MM) the position (n_{peak}) of each peak in the accumulation register (ACR) as well as its sign (a_{peak}).

9. Method according to claim 8, characterized by the fact that the preamble contains an additional flipped last replica (LFR) of the training sequence, and by the fact that said detection step comprises a second sub-step including sequentially scanning the next replicas until the flipped last one (LFR) is found.

10. Method according to claim 9, characterized by the fact that scanning a next replica comprises performing a correlation (131) between the next replica and the training sequence, comparing the correlation result with a second predetermined threshold (TH2), and if the absolute value of the

correlation result exceeds said second threshold, using the sign of the correlation result and the sign of each detected peak to decide whether said next replica is the last one or if the scanning operation must be performed with the replica following said next replica.

11. Method according to any one of the preceding claims, characterized by the fact that said wireless data communication system is of the WPAN type, for example organized in "piconet" fashion.

12. Independent data device of a wireless data communications system, comprising

- reception means (RCM) for receiving an incident pulsed signal of the ultra wide band type from a channel, said incident signal carrying containing a preamble including a training sequence having a series of pulses whose polarity and time shifts are defined by respective polarity code and time-hopping code, and
- synchronization means (SYM) comprising
  - digital cross-correlation means (CRM) for performing a cross-correlation of the received signal with said training sequence, said cross-correlation step including algebraically summing in accordance with said polarity code, windows of said received signal, the starting points of said windows being determined by said time-hopping code, and
  - detection means (DM) for detecting the end point of the preamble from the result delivered by said cross-correlation means.

13. Device according to claim 12,

characterized by the fact said training sequence is periodic and comprises replicas, each of which having a size of N samples and containing L pulses, by the fact that each window has a size of N samples, and by the fact that said digital cross-correlation means (CRM) is adapted to perform the cross-correlation step iteratively in a block-by-block fashion until a stop criterion is reached, the starting points of two consecutive blocks of correlation being separated by 2N samples, by the fact that said cross-correlation means comprises an accumulation register capable of storing N data, and processing means adapted, for each iteration, to:

- a) initialize the content of said accumulation register,
- b) take a first group of N samples of the received signal starting from the starting point of the corresponding block increased by the time shift of the first pulse,
- c) multiply said first group by the polarity of said first pulse,
- d) add the resulting group of N samples to the content of said accumulation register, and
- repeat sub-steps b) to d) for all the L pulses.

14. Device according to claim 12, characterized by the fact that said training sequence is periodic and comprises at least M+1 replicas, each replica having a size of N samples and containing L pulses, M being a sub-multiple of N greater than or equal to 2, by the fact that said digital cross-

correlation means (CRM) is adapted to perform the cross-correlation step iteratively in a block-by-block fashion until a stop criterion is reached, the computation of each block being split into M slices which are computed by algebraically summing windows N/M samples long.

15. Device according to claim 14, characterized by the fact that the incident signal carries information within a super frame structure, each super frame containing said preamble including at least M+1 synchronization slots corresponding respectively to the replicas of the training sequence, and by the fact that said cross-correlation means (CRM) is adapted to compute each slice using one synchronization slot.

16. Device according to claim 15, characterized by the fact, by the fact that said digital cross-correlation means (CRM) is adapted to perform the cross-correlation step iteratively in a block-by-block fashion until a stop criterion is reached, the starting points of two consecutive blocks of correlation being separated by N +N/M samples, by the fact that said cross-correlation means comprises an accumulation register capable of storing N/M data, and processing means (PRM) adapted for each iteration, to:

- a) initialize the content of said accumulation register,
- b) take a first group of N/M samples of the received signal starting from the starting point of the corresponding block increased by the time shift of the first pulse,

- c) multiply said first group by the polarity of said first pulse,

- d) add the resulting group of N/M samples to the content of said accumulation register, and

- repeat sub-steps b) to d) for all the L pulses.

17. Device according to claim 14, characterized by the fact that the incident signal carries information within a super frame structure, each super frame containing said preamble including at least M+1 synchronization slots corresponding respectively to the replicas of the training sequence, and by the fact that said cross-correlation means (CRM) is adapted to compute each slice using several adjacent synchronization slots belonging to several consecutive super frames.

18. Device according to any one of claims 13 to 17, characterized by the fact that said cross-correlation means (CRM) comprises comparison means (CMP) for comparing after each correlation iteration, the content of the accumulation register (ACR) with a first predetermined threshold, and by the fact that said stop criterion comprises the detection of at least one sample, called peak, of said accumulation register having a value greater than said first predetermined threshold, or a predetermined maximum number of correlation iterations.

19. Device according to claim 18, characterized by the fact that said detection means

(DM) comprises memory means (MM) and storing means (STM) for storing in said memory means the position of each peak in the accumulation register as well as its sign.

20. Device according to claim 19, characterized by the fact that the preamble contains an additional flipped last replica (LFR) of the training sequence, and by the fact that said detection means comprises scanning means (SCM) for sequentially scanning the next replicas until the flipped last one is found.

21. Device according to claim 20, characterized by the fact that said scanning means comprises correlation means (CMX) for performing a correlation between the next replica and the training sequence, comparison means (CMPX) for comparing the correlation result with a second predetermined threshold, and control means (CTLM) for, if the absolute value of the correlation result exceeds said second threshold, using the sign of the correlation result and the sign of each detected peak to decide whether said next replica is the last one or if the scanning operation must be performed with the replica following said next replica.

22. Device according to any one of claims 12 to 21, characterized by the fact that said wireless data communication system is of the WPAN type, for example organized in "piconet" fashion.